

REMARKS

Claims 1-50 are pending in the application, claims 51-78 being canceled herein. Claim 1 is the only independent claim.

Restriction Requirement

Claims 1-78 stand subject to a Restriction Requirement according to which the Examiner has divided the claims into two groups, namely, Group I including claims 1-50 directed to a microfluidic mixing apparatus and Group II containing claims 51-78 drawn to a method for mixing materials.

In response to the Restriction Requirement, applicant provisionally elected the claims of Group I, i.e., claims 1-50, for continued prosecution in the application. The election was made with traverse.

The Examiner has maintained and finalized the Restriction Requirement. Accordingly, applicants cancel claims 51-78 herein without prejudice to applicants' refiling those claims in a subsequent divisional application.

The Specification

The specification has been amended herein to provide clear antecedent support for language added to claim 1. This language is not considered to constitute new matter but instead provides an alternative description for subject matter disclosed in the original specification and drawings..

Claims Rejections - 35 U.S.C. § 112

Claim 10 stands rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as

the invention. The Examiner specifically maintains that the limitation “said fluid flow stream” is unclear as to whether it refers to the first or second fluid flow stream.

In response to the rejection of claim 10 under 35 U.S.C. § 112, second paragraph, that claim has been amended herein to recite that the first fluid flow stream peristaltic pump is located along the first fluid flow stream between the autosampler and the junction device.

Claims Rejections - 35 U.S.C. §§ 102 and 103

Claims 1, 16-18, 21, 24, 29-34, 42-44, 46, 47, 49, and 50 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 2,933,293 to Ferrari, Jr. (“Ferrari”). The Examiner particularly maintains, *inter alia*, that the first driving means and the second driving means of applicants’ claim 1 are found in the pump (12) of Ferrari Figure 1 and that the first inlet port and the second inlet port of applicants’ junction device have counterparts in the sample inlet and the reagent inlet of Ferrari’s pump (12). The Examiner maintains further that the first reaction zone and the second reaction zone of applicants’ correspond to reference numerals 30 and 44 in the Ferrari reference, respectively.

Claims 27 and 28 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ferrari.

Claims 19, 20, 22, 23, 25, 26, and 35-39 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ferrari in view of U.S. Patent No. 6,132,685 to Keresco et al.

Claim 45 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Ferrari in view of U.S. Patent No. 6,440,645 to Yon-Hin et al..

Claim 48 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Ferrari in view of U.S. Patent No. 6,235, 685 to Knapp.

Claims 2-15 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ferrari in view of U.S. Patent No. 4,853,336 to Saros et al.

Claims 40 and 41 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ferrari in view of U.S. Patent No. 5,679,310 to Manns.

Claim 1 Applicants have amended claim 1 herein to provide a better definition of the invention and to correct grammatical and syntactical shortcomings. Applicants respectfully maintain that claim 1 distinguishes the invention over the prior art and particularly over the art relied on by the Examiner in rejecting the claims of the instant application.

As set forth in amended claim 1 , a microfluidic mixing apparatus comprises first driving means for driving a plurality of reagent samples from a plurality of respective source wells into a first fluid flow stream, second driving means for introducing a separation gas between each of the plurality of reagent samples in the first fluid flow stream to produce a gas-separated first fluid flow stream, means for driving a second fluid flow stream comprising a plurality of particles, and a junction device downstream of the first driving means and the second driving means. The junction device comprises a first inlet port for receiving the gas-separated first fluid flow stream, a second inlet port for receiving the second fluid flow stream, a first reaction zone for forcing an initial mixing between the gas-separated first fluid flow stream and the second fluid flow stream to thereby form a reaction product stream, an outlet port for allowing the reaction product stream to exit the junction device. The microfluidic mixing apparatus further comprises a second reaction zone downstream of the junction device where the plurality of reagent samples and the plurality of particles further mix and form a plurality of reaction products, the second reaction zone communicating with the outlet port, and means operatively connected to the outlet port and the second reaction zone for selectively analyzing the reaction product stream for the reaction products.

Applicants respectfully traverse the rejection of amended claim 1 under 35 U.S.C. § 102(b) and maintain that applicants' invention as set forth in amended claim 1 distinguishes over the prior art relied on by the Examiner in rejecting applicant's claims. Applicants' microfluidic mixing apparatus as defined in amended claim 1 bears only a spurious resemblance to the mixing device of Ferrari.

Applicants respectfully traverse the rejection of claim 1 under 35 U.S.C. § 102(b).

- Ferrari discloses a fluidic circuit that is different from applicants' claimed microfluidic mixing device and that does not suggest applicants' claimed device.

The Examiner contends that the first inlet port and the second inlet port of applicants' junction device have counterparts in the sample inlet and the reagent inlet of Ferrari's pump (12). However, these inlets in Ferrari's device are inlets to the pump and are necessarily upstream thereof. In contrast, in the microfluidic mixing device of applicants' claim 1, the junction device and particularly the inlet ports thereof are downstream of the driving means and receive the gas-separated first fluid flow stream and the second fluid flow stream therefrom.

The Examiner maintains further that the first reaction zone and the second reaction zone of applicants' microfluidic mixing device correspond to reference numerals 30 and 44 in the Ferrari reference, respectively. However, according to applicants' claim 1, the first reaction zone is the situs of initial mixing between the gas-separated first fluid flow stream and the second fluid flow stream to thereby form a reaction product. Such mixing cannot occur at the locations of reference numeral 30 or 44 in the Ferrari fluidic mixing circuit because the gas-separated sample fluid flow stream from the upper part of the Ferrari circuit does not flow to those locations. The gas-separated sample fluid flow stream from the upper part of the Ferrari circuit follows a separate path from that of the reagent flow stream and does not mix therewith. Instead, the gas-separated sample fluid flow stream from the upper part of the Ferrari circuit

flows into the upper portion of dialyzer 18 at the left side thereof and flows out of the dialyzer at the upper right port thereof. The gas-separated sample fluid flow stream from the upper part of the Ferrari circuit never flows to locations 30 and 44 in the Ferrari circuit.

Conclusion

For the foregoing reasons, independent claim 1, as well as the claims dependent therefrom, is deemed to be in condition for allowance. An early Notice to that effect is earnestly solicited.

Should the Examiner believe that direct contact with applicant's attorney would advance the prosecution of this application, the Examiner is invited to telephone the undersigned at the number below.

Respectfully submitted,

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